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Procedures for Emission Inventory Preparation
Volume V: Bibliography

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Procedures for Emission Inventory Preparation

Volume V: Bibliography

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16. ABSTRACT

Procedures are described for compiling the complete comprehensive emission inventory of the criteria pollutants and pollutant sources. These procedures described are for use in the air quality management programs of state and local air pollution control agencies.

Basic emission inventory elements--planning, data collection, emission estimates, inventory file formatting, reporting and maintenance--are described. Prescribed methods are presented; optional methods are provided. The procedures are presented in five (5) volumes:

Volume I, Emission Inventory Fundamentals
Volume II, Point Sources
Volume III, Area Sources
Volume IV, Mobile Sources
Volume V, Bibliography

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NOTICE

The Procedures for Emission Inventory Preparation consists of these five volumes.

Volume I - Emission Inventory Fundamentals
Volume II - Point Sources
Volume III - Area Sources
Volume IV - Mobile Sources
Volume V - Bibliography

They are intended to present emission inventory procedures and techniques applicable in State and local air programs, and for contractors and other selected users. The object is to provide the best available and "state of the art" information. For some areas, however, the available source information and data either may allow more precise procedures and more accurate estimation of emissions or may not be amenable to the use of these procedures. Therefore, the user is asked to share his knowledge and experience by providing comments, successfully applied alternative methods or other emission inventory information useful to other users of these volumes. Please forward comments to the U.S. Environmental Protection Agency, Air Management Technology Branch, (MD-14), Research Triangle Park, NC 27711. Such responses will provide guidance for revisions and supplements to these volumes.

Other U.S. EPA emission inventory procedures publications:

Procedures for the Preparation of Emission Inventories for Volatile Organic Compounds, Volume I, Second Edition, EPA-450/2-77-028, U.S. Environmental Protection Agency, Research Triangle Park, NC, September 1980.

Procedures for the Preparation of Emission Inventories of Volatile Organic Compounds, Volume II: Emission Inventory Requirements for Photochemical Air Quality Simulation Models, EPA-450/4-79-018, U.S. Environmental Protection Agency, Research Triangle Park, NC, September 1979.

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Procedures for Emission Inventory Preparation

Volume V: Bibliography

by

Monitoring and Data Analysis Division
Office of Air Quality Planning and Standards

U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Air, Noise and Radiation
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

September 1981

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1.0 INTRODUCTION AND ORGANIZATION

1.1 INTRODUCTION

This document is the last of a five volume series dealing with the preparation of emission inventories. It presents an extensive listing of pertinent reference materials which are currently available in the literature. These references were assembled to assist state and local air pollution agency personnel in preparing and maintaining the emission inventory. A concise abstract outlining the specific emission inventory information is provided for each reference cited.

The other volumes in this Procedures for Emission Inventory Preparation series are:

Volume I--Emission Inventory Fundamentals

Volume II--Point Sources

Volume III--Area Sources

Volume IV--Mobile Sources

Each volume examines the rationale and procedures necessary to prepare an emission inventory and includes examples to assist the user in understanding specific methods and procedures.

This volume of the emission inventory preparation series is presented to give the agency a central resource which lists relevant emission inventory-related documents. As with the other volumes in this series, it will be updated periodically to include the latest reports, articles, and studies on emission inventory procedures and activities. Users of this document are encouraged to suggest additional references for inclusion in the bibliography. These suggestions should be forwarded to:

Air Management Technology Branch
Monitoring and Data Analysis Division
Office of Air Quality Planning and Standards
Research Triangle Park, NC 27711

1.2 ORGANIZATION

This volume is divided into two main sections, References and Abstracts. References are contained in subsections organized around source and pollutant type, while the abstracts of the references are listed in numerical order.

Section 2.0, References, simply lists the title and sponsoring agency or author for each document. When an EPA report number or paper number has been assigned to the document, that number is also included to facilitate its

retrieval. EPA reports can be obtained from EPA regional offices, the EPA division which funded the project, or from the National Technical Information Services in Springfield, Virginia. In attempting to locate any EPA-related reference, the regional EPA Office Library should be contacted.

Each reference included in Section 2.0 is given an alphanumeric index number. This number relates the reference to the source and pollutant types it discusses and will enable the user to concentrate research efforts in specific areas of concern. The left-most character of the index number (which is always a letter) specifies the source type covered by the document. These source types with their respective identifying letters are:

S - All source types

P - Point sources

A - Area sources

M - Mobile sources

When a reference is concerned with all types of sources, it is assigned a letter "S." If a specific reference has applicability to two types of sources (e.g., point and area), it is listed separately under each source type.

The first digit to the right of the letter specifies the pollutant discussed in the reference. This numerical identifier is assigned as follows:

1 - All except lead (Pb)

2 - TSP

3 - SO_2

4 - CO

5 - NO_x

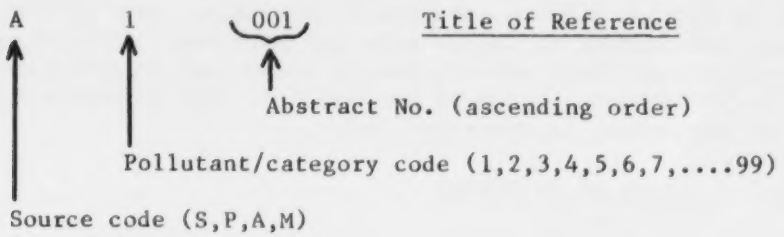
6 - HC

7 - Pb

In addition, there is an index number (99) assigned to those documents which cover program management or are more general in nature. Again, this numbering convention allows the user to concentrate on those references which may be of use in the area of concern.

Finally, following the pollutant indicator are the three right-most digits which specify the abstract number. This number is sequentially assigned to each abstract and identifies the location of each abstract within Section 3.0.

The alphanumeric system is diagrammed below for the references.



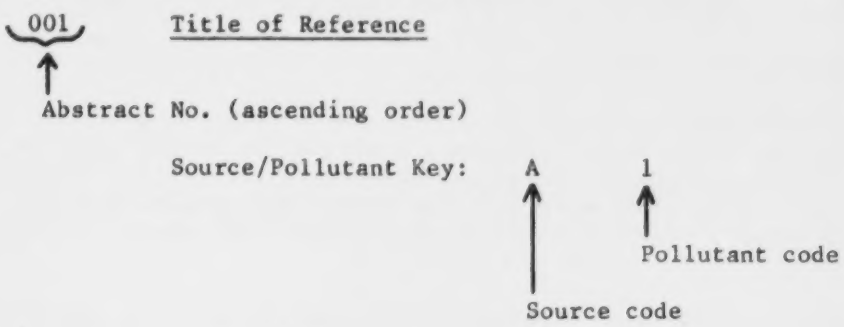
Ninety-eight references are listed by source type and pollutant type in the reference section. Table 1 presents a matrix, by source type and pollutant, of the number of references included in this volume. Because some references are listed under more than one source type and/or pollutant, the total of the numbers shown in Table 1 exceeds the total number of references.

TABLE 1. NUMBER OF REFERENCES CONTAINED IN THE BIBLIOGRAPHY, BY SOURCE TYPE AND POLLUTANT

Pollutant/code	Source type (code)			
	All (S)	Point (P)	Area (A)	Mobile (M)
All[a]/1	7	1	5	11
TSP/2	5	5	6	1
SO_2/3	2	1	0	0
CO/4	1	0	2	2
NO_x/5	3	0	1	1
HC/6	12	9	15	2
Pb/7	4	3	1	1
Program management/99	26	6	11	12

[a]Except lead (Pb).

Abstracts in Section 3.0 are arranged in ascending order of the assigned abstract number, independent of source type and pollutant. Abstracts are assigned source/pollutant keys which cross-reference the abstract to locations in the source/pollutant subsections of Section 2.0. The alphanumeric system, as used with the abstracts, is presented below.



The content of each abstract is oriented toward the emission inventory-related aspects of the reference. By reading the abstracts, users of this volume can quickly review the thrust of many references and select those which are most pertinent.

Ideally, this bibliography can be used most efficiently in the following manner:

Step 1--In the reference section, find all those references pertaining to the source type and pollutant type of interest. Check listings for "all sources" (source code "S") and all pollutants (pollutant/category code "1"), in addition to those references cited in specific source/pollutant areas.

Step 2--Use the abstract number associated with each reference to locate the abstract in Section 3.0. Read the abstract and decide if the reference may be of value in your project.

Step 3--Request those references which may be of use from your Regional EPA Office Library. If they do not have the specific reference(s), they will direct you to the nearest source.

This bibliography will be updated as additional documents on emission inventory preparation become available. A new emission inventory document will be assigned the appropriate source and pollutant codes and the reference inserted under the corresponding subsection(s) in Section 2.0. The document will then be assigned the next abstract number in sequence and the abstract added at the end of Section 3.0. This system can also be expanded to include new criteria pollutants (pollutant codes 8 through 98) and new source types (designated with letter codes as appropriate).

2.0 REFERENCES

2.1 ALL SOURCES

2.1.1 ALL POLLUTANTS (TSP, SO_2, CO, NO_x, HC)

S 1 002 Guide for Compiling a Comprehensive Emission Inventory, APTD-1135, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, March 1973.

S 1 013 Compilation of Air Pollutant Emission Factors, Third Edition with Supplements, AP-42, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, October 1980.

S 1 037 Emissions Forecasting Methodology, PB 238 259, State of California, Air Resources Board, Sacramento, CA, July 1974.

S 1 050 Grems, C., "Air Force Emission Inventories," Emission Inventory/Factor Workshop, Volume I, EPA-450/3-78-042a, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, May 1978, pp. 5-1 to 5-14. (See abstract 042.)

S 1 083 Regional Air Pollution Study: Emission Inventory Summarization, EPA-600/4-79-004, U.S. Environmental Protection Agency, Environmental Sciences Research Laboratory, Research Triangle Park, NC, January 1979.

S 1 087 Revision of Emission Factors for Petroleum Refining, EPA-450/3-77-030, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, October 1977.

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2.1.2 TOTAL SUSPENDED PARTICULATES (TSP)

S 2 023 Particulate Control for Fugitive Dust, EPA-600/7-78-071, U.S. Environmental Protection Agency, Research Triangle Park, NC, April 1978.

S 2 024 Particulate Emission Factors Applicable to the Iron and Steel Industry, EPA-450/4-79-028, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, August 1979.

S 2 028 Emissions Inventory in the SURE Region, Research Project 862-5, Electric Power Research Institute, Palo Alto, CA, July 1978.

S 2 029 Implementation and Coordination of the Sulfate Regional Experiment (SURE) and Related Research Programs, Research Project 862-2, Electric Power Research Institute, Palo Alto, CA, October 1977.

S 2 065 An Implementation Plan for Suspended Particulate Matter in the Phoenix Area, Vol. II - Emission Inventory, EPA-450/3-77-021b, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, December 1977.

2.1.3 SULFUR DIOXIDE (SO_2)

S 3 028 Emissions Inventory in the SURE Region, Research Project 862-5, Electric Power Research Institute, Palo Alto, CA, July 1978.

S 3 029 Implementation and Coordination of the Sulfate Regional Experiment (SURE) and Related Research Programs, Research Project 862-2, Electric Power Research Institute, Palo Alto, CA, October 1977.

2.1.4 CARBON MONOXIDE (CO)

S 4 060 Control Techniques for Carbon Monoxide Emissions, EPA-450/3-79-006, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, June 1979.

2.1.5 OXIDES OF NITROGEN (NO_x)

S 5 028 Emissions Inventory in the SURE Region, Research Project 862-5, Electric Power Research Institute, Palo Alto, CA, July 1978.

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S 5 040 Emission Inventory Requirements for 1982 Ozone State Implementation Plans, EPA-450/4-80-016, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, December 1980.

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S 6 032 Procedures for the Preparation of Emission Inventories for Volatile Organic Compounds, Volume II, Emission Inventory Requirements for Photochemical Air Quality Simulation Models, EPA-450/4-79-018, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, September 1978.

S 6 033 Hydrocarbon Control Strategies for Gasoline Marketing Operations, EPA-450/3-78-017, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, April 1978.

S 6 034 End Use of Solvents Containing Volatile Organic Compounds, EPA-450/3-79-032, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, May 1979.

S 6 040 Emission Inventory Requirements for 1982 Ozone State Implementation Plans, EPA-450/4-80-016, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, December 1980.

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S 6 046 Bartosh, C. P., W. J. Moltz, and B. P. Cerepuka, "Organic Emission Inventory Considerations and Purposes," Emission Inventory/Factor Workshop, Volume I, EPA-450/3-78-042a, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, May 1978, pp. 1-1 to 1-14. (See abstract 042.)

S 6 048 Henderson, David C., "Documentation of Emission Inventories in Region IX," Emission Inventory/Factor Workshop, Volume I, EPA-450/3-78-042a, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, May 1978, pp. 3-1 to 3-14. (See abstract 042.)

S 6 052 Carter, E. L., and J. W. Paisie, "Maryland Special Factors and Inventory Techniques," Emission Inventory/Factor Workshop, Volume I, EPA-450/3-78-042a, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, May 1978, pp. 7-1 to 7-22. (See abstract 042.)

S 6 073 Point and Area Source Organic Emission Inventory (RAPS), EPA-600/4-78-028, U.S. Environmental Protection Agency, Research Triangle Park, NC, June 1976.

S 6 091 Volatile Organic Compound (VOC) Species Data Manual, EPA-450/4-80-015, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, July 1980.

2.1.7 LEAD (Pb)

S 7 020 Development of HATREMS Data Base and Emission Inventory Evaluation, EPA-450/3-77-011, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, April 1977.

S 7 038 Control Techniques for Lead Air Emissions, Volume I, EPA-450/2-77-012, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, December 1977.

S 7 068 Supplementary Guidelines for Lead Implementation Plans, EPA-450/2-78-038, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, August 1978.

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S 99 010 Report on Source/Emission Inventory Systems and Data Bases for the Standing Air Monitoring Work Group, Emission Inventory Work Group of SAMWG, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, December 1977, Revised August 1978.

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S 99 018 Guidelines for Air Quality Maintenance Planning and Analysis, Vol. 2: Plan Preparation, EPA-450/4-74-002, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, July 1974.

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S 99 041 1977 National Emissions Report, EPA-450/1-80-005, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, March 1980.

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S 99 046 Bartosh, C. P., W. J. Moltz, and B. P. Cerepuka, "Organic Emission Inventory Considerations and Purposes," Emission Inventory/Factor Workshop, Volume I, EPA-450/3-78-042a, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, May 1978, pp. 1-1 to 1-14. (See abstract 042.)

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S 99 050 Grems, C., "Air Force Emission Inventories," Emission Inventory/Factor Workshop, Volume I, EPA-450/3-78-042a, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, May 1978, pp. 5-1 to 5-14. (See abstract 042.)

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S 99 070 Manpower Planning Model, EPA-450/3-75-034, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, March 1975.

S 99 078 Emission Density Zoning Guidebook--A Technical Guide to Maintaining Air Quality Standards Through Land Use Based Emission Limits, EPA-450/3-78-048, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, September 1978.

S 99 090 Development of Questionnaires for Various Emission Inventory Uses, EPA-450/2-78-122, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, June 1979.

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2.2.1 ALL POLLUTANTS (TSP, SO_2, CO, NO_x, HC)

P 1 003 New Jersey NEDS Point Source Emission Inventory, EPA-902/4-77-008, U.S. Environmental Protection Agency, Region II, New York, NY, May 1977.

2.2.2 TOTAL SUSPENDED PARTICULATES (TSP)

P 2 011 Emissions Control in the Grain and Feed Industry, Volume II: Emission Inventory, EPA-450/3-73-003b, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, September 1974.

P 2 030 Assessment of Fugitive Particle Emission Factors for Industrial Processes, EPA-450/3-78-107, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, September 1978.

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2.2.3 SULFUR DIOXIDE (SO_2)

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2.2.4 CARBON MONOXIDE (CO)

P 4

2.2.5 OXIDES OF NITROGEN (NO_x)

P 5

2.2.6 HYDROCARBONS (HC); VOLATILE ORGANIC COMPOUNDS (VOC)

P 6 004 Procedures for the Preparation of Emission Inventories for Volatile Organic Compounds - Volume I (second edition), EPA-450/2-77-028, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, September 1980.

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2.2.7 LEAD (Pb)

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A 2 036 Quantification of Dust Entrainment from Paved Roadways, EPA-450/3-77-027, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, July 1977.

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A 2 096 Development of Emissions Factors for Fugitive Dust Sources, EPA-450/3-74-037, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, June 1974.

A 2 097 Fine Particulate Emission Inventory and Control Survey, EPA-450/3-74-040, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, January 1974.

2.3.3 SULFUR DIOXIDE (SO_2)

A 3

2.3.4 CARBON MONOXIDE (CO)

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2.3.5 OXIDES OF NITROGEN (NO_x)

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2.3.6 HYDROCARBONS (HC); VOLATILE ORGANIC COMPOUNDS (VOC)

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A 6 046 Bartosh, C. P., W. J. Moltz, and B. P. Cerepuka, "Organic Emission Inventory Considerations and Purposes," Emission Inventory/Factor Workshop, Volume I, EPA-450/3-78-042a, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, May 1978, pp. 1-1 to 1-14. (See abstract 042.)

A 6 049 Trapasso, J. A., and W. K. Duval, "Methodologies and Problems Encountered in a Level 3 Multi-State/County Hydrocarbon Area Source Emissions Inventory," Emission Inventory/Factor Workshop, Volume I, EPA-450/3-78-042a, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, May 1978, pp. 4-1 to 4-26. (See abstract 042.)

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A 6 077 Methodologies for Countywide Estimation of Coal, Gas and Organic Solvent Consumption, EPA-450/3-75-086, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, December 1975.

A 6 081 Study of Area Source Hydrocarbon Emissions, prepared for Illinois Environmental Protection Agency, July 1978.

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2.3.7 LEAD (Pb)

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2.4 MOBILE SOURCES

2.4.1 ALL POLLUTANTS (TSP, SO_2, CO, NO_x, HC)

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M 1 045 User's Manual for the APRAC-2 Emissions and Diffusion Model, Stanford Research Institute, Menlo Park, CA, June 1977.

M 1 047 Computer Programs for Urban Transportation Planning, PLANPAC/BACKPAC, General Information Manual, U.S. Department of Transportation, Federal Highway Administration, Washington, DC, April 1977.

M 1 059 How to Pattern the Transportation Portion of Your State Air Quality Implementation Plan, DOT/FHWA 6/80, Technical Guidance of the U.S. Department of Transportation, Federal Highway Administration, and the U.S. Environmental Protection Agency, June 1980.

M 1 062 Compilation of Air Pollutant Emission Factors: Highway Mobile Sources, EPA/460-3-81-005, U.S. Environmental Protection Agency, Office of Mobile Source Air Pollution Control, Ann Arbor, MI, March 1981.

M 1 067 Exhaust Emissions From Uncontrolled Vehicles and Related Equipment Using Internal Combustion Engines, Part 3: Motorcycles, APTD-1492, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, March 1973.

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M 1 076 Methodology for Estimating Emissions From Off-Highway Mobile Sources for the RAPS Program, EPA-450/3-75-002, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, October 1974.

M 1 084 Mobile Source Inventories Using Transportation Models, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, 1978.

M 1 092 Line and Area Source Emissions From Motor Vehicles in RAPS Program, EPA-450/3-77-019, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, June 1976.

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2.4.3 SULFUR DIOXIDE (SO_2)

M 3

2.4.4 CARBON MONOXIDE (CO)

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2.4.6 HYDROCARBONS (HC); VOLATILE ORGANIC COMPOUNDS (VOC)

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2.4.7 LEAD (Pb)

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2.4.8 PROGRAM MANAGEMENT

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3.0 ABSTRACTS

001 Southerland, James H., "Emission Inventories: A Perspective," presented at the 71st Annual Meeting of the Air Pollution Control Association, Houston, TX, June 25-30, 1978.

Source/Pollutant Key: S 99

This paper discusses the purpose and associated constraints of emission inventories and is not intended as a technical guide. Topics include the role of emission inventories in air quality management programs, as planning tools, and as data bases for simulation modeling. Technical, legal, and economic constraints in conducting emission inventories are considered as well as agency interaction with the private sector. Deficiencies of inventories are examined and measures of quality assurance are suggested.

002 Guide for Compiling a Comprehensive Emission Inventory, APTD-1135, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, March 1973.

Source/Pollutant Key: S 1, S 99

This document represents a significant early effort by EPA to establish a uniform documented set of procedures for preparing emission inventories. Detailed procedures are given for obtaining and codifying information about air pollutant emissions from stationary and mobile sources. The NEDS system, which was developed specifically for use by state and local air pollution control agencies, is described in some detail. Because of the large amount of information that must be collected, it is recommended that the data be handled by ADP means.

A uniform coding system (NEDS) for the data is encouraged in order that the information from one region may be compared with that from another. Detailed procedures are given concerning the information to be gathered from each source, the methods to be used to gather the information, the codes to be used to simplify the information on standard coding forms, the geographical and population information needed about the area of interest, the apportionment techniques and emission factors needed, and the methods of displaying the data. The relation of state and local emission inventory systems to the EPA National Emission Data System is also explained.

003 New Jersey NEDS Point Source Emission Inventory, EPA-902/4-77-008, U.S. Environmental Protection Agency, Region II, New York, NY, May 1977.

Source/Pollutant Key: P 1, P 99

This report summarizes the updating of the New Jersey NEDS for EPA Region II. Methodology used in upgrading the NEDS files included identification of missing data on facilities, sources, or data requisite for air quality dispersion modeling. Samples of letters, instructions and questionnaires used to collect additional information from stationary sources are included in the report. A Missing Data Form was developed to identify missing information and additional emission sources common to particular industries. Regular amendments of the NEDS files and the establishment of a verification file for identifying facilities not in the NEDS files are recommended.

004 Procedures for the Preparation of Emission Inventories for Volatile Organic Compounds - Volume I (second edition), EPA-450/2-77-028, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, September 1980.

Source/Pollutant Key: P 6, A 6

The major emphasis of this volume is on the development of a VOC emission inventory that is useful in various facets of an ozone control program. The procedures in this document will be generally applicable to developing VOC emission inventories for use in other program areas and also to developing inventories of pollutants other than VOC, including NO_x.

Various planning considerations are explored, and guidance is offered to the agency to help it decide which inventory approach should ultimately be pursued, given the resources it has available. A generalized flowchart is presented which outlines the major activities necessary in the basic emission inventory compilation effort. A description of the various ways source and emission data can be collected on individual sources for use in the point source inventory is provided, as well as descriptions of procedures for making collective activity level and emission estimates for those area sources generally too small or too numerous to be considered individually in the point source inventory. Such procedures include making field surveys of actual area source activity as well as the use of surrogate indicators of area source activity such as population and employment.

Procedures for handling source test data and performing material balances are described. The basic use of emission factors is reviewed, including cases where adjustments can be made to reflect specific source parameters and environmental conditions. Also presented are procedures for "scaling up" the inventory to account for missing sources as well as for adjusting the VOC emissions to exclude nonreactive components. Finally, seasonal adjustment of the inventory is discussed along with techniques for projecting emission totals and for the presentation of inventory information in various ways useful to the agency. Reporting can include listings of the individual data items contained in the inventory files as well as various kinds of summary manipulations.

The appendices contain a glossary of important terms used in conjunction with VOC emission inventories; a detailed listing of point source process emission points; summary descriptions of the VOC sources for which EPA has or will establish control techniques guidelines (CTG); an example of a cover letter and questionnaire used in mailing surveys for point source inventories; a number of examples of emission inventory documentation; and summary descriptions of the NEDS and EIS/P&R inventory systems available from EPA for general use.

005 Regional Air Pollution Study, Off Highway Mobile Source Emission Inventory, EPA-600/4-77-041, U.S. Environmental Protection Agency, Research Triangle Park, NC, October 1977.

Source/Pollutant Key: M 1, M 99

Emissions calculations were performed for the metropolitan St. Louis Air Quality Control Region for unregulated sources with a spatial correlation to a grid-element system. EPA methodology was used to determine pollutant emissions. Equipment source categories included motorcycles, lawn and garden equipment, construction equipment, industrial equipment, farm equipment, and outboard motorboats.

Procedures for the estimation of the number of sources, emission factors, and emissions by grid elements are explained in detail. Due to the limited data available, some assumptions were made to determine the order of magnitude of emissions.

006 Development of a Methodology and Emission Inventory for Fugitive Dust for the Regional Air Pollution Study, EPA-450/3-76-003, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, January 1976.

Source/Pollutant Key: A 2, A 99

The development of a methodology for a fugitive dust emission inventory for the metropolitan St. Louis Air Quality Control Region included adjusting emission factors for local climate and surface conditions, deriving temporal apportioning factors, and estimating hourly distributions. Six sources were examined: unpaved roads, agricultural land tillings, wind erosion of agricultural land, construction sites, aggregate storage piles, and unpaved airstrips. Example calculations are included, and results presented show county emission totals for each source. An assessment of factors which determine the drift distance of fugitive dust particles is included in the Appendix.

007 AEROS Manual Series, Volume I: AEROS Overview, EPA-450/2-76-011, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, September 1980. (Update No. 3.)

Source/Pollutant Key: S 99

The Aerometric and Emissions Reporting System (AEROS) was established by the Environmental Protection Agency to serve as a management information system for EPA's air pollution research and control programs. As such, AEROS is mainly concerned with the collection, processing, and reporting of basic air pollution data. Various supplementary data files are also maintained to provide additional information valuable for the preparation and analysis of air pollution data.

In addition to this overview Volume I, there are four additional AEROS volumes which describe AEROS operations in more detail. AEROS Volume II is the AEROS User's Manual, which gives instructions for users to input data to AEROS, along with detailed systems descriptions. Volume III, the AEROS Summary and Retrieval Manual, is intended for those who want to obtain data from AEROS. Volume III describes AEROS reports and how they may be used, and gives instructions for obtaining them. Volume IV is the NADB Internal Operations Manual, which documents in detail all NADB procedures related to AEROS. Although Volume IV is intended mainly as a guide for NADB personnel, certain portions may be useful to persons interested in the details of AEROS operations. Volume V is the AEROS Coding Manual. It contains tables of standard codes required for AEROS data input.

008 The Emission Inventory System/Point Source User's Guide, EPA-450/4-80-010, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, May 1980.

Source/Pollutant Key: P 99

The major functions of the Emissions Inventory System/Point Source Subsystem (EIS/PS) are creating and maintaining a valid data base, accessing and manipulating that data base, and producing reports. This User's Guide is structured to reflect these functions; i.e., the programs and procedures in EIS/PS are documented within these three groupings. The discussions of the EIS/PS functions and programs comprise Section 4.0 FILE CREATION AND MAINTENANCE, Section 5.0 DATA ACCESSING AND MANIPULATION, and Section 6.0 REPORTS.

Each of these sections contains an introduction which explains the particular function and operating instructions for each of the programs which comprise that function. Flow charts illustrating the operation of the programs are included in each introduction. The program operating instructions consist of a description of the program, the formats of the files accessed by the program, a discussion of program options, and a list of error messages produced by the program. A discussion of the Job Control Language (JCL) for executing the program, warnings and special instructions, cost estimates, and related programs and procedures are also included.

In addition to these program sections, this User's Guide includes sections which provide information necessary for full utilization of EIS/PS. Section 2.0 OVERVIEW OF EIS/PS provides a brief discussion of the subsystem, explains the program design, and provides a system flowchart. Section 3.0 ECONOMICS discusses the cost of installing and operating EIS/PS as well as ways to reduce these costs. Section 7.0 INTER-FUNCTIONAL PROCEDURES describes sample run streams which execute programs from more than one functional area, such as producing a report from a retrieved answer file. Section 8.0 JCL AND GENERAL TOPICS discusses the IBM JCL used in the EIS/PS catalogued procedures and explains the installation and updating processes.

009 The Emission Inventory System/Area Source User's Guide, EPA-450/4-80-009, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, May 1980.

Source/Pollutant Key: A 99

The Emissions Inventory System/Area Source (EIS/AS) is a subsystem of the Comprehensive Data Handling System (CDHS). Its major functions are creating and maintaining a valid area source emission data base, assessing and manipulating that data base, and producing reports. The User's Guide is structured to reflect these three functions--each has its own section, describing the function in general and including operating instructions for each of its programs. A discussion of the necessary JCL, warnings and special instructions, cost estimates, and related programs and procedures are also included.

010 Report on Source/Emission Inventory Systems and Data Bases for the Standing Air Monitoring Work Group, Emission Inventory Work Group of SAMWG, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, December 1977, Revised August 1978.

Source/Pollutant Key: S 99

The Emission Inventory Work Group was formed by SAMWG to recommend the required items comprising a source/emission inventory. The report identifies the objectives of an emission inventory as well as requirements set by the Clean Air Act and its Amendments. A comprehensive listing of information necessary for geographical and categorical emission inventories for point, area and line sources is included.

Some recommendations of the work group include: a more flexible source/emissions inventory system; provisions for uniform source categories by different agencies; standardized data collection and feedback procedures; higher priority and greater allocation of resources for emission inventory activities; and elimination of conflicting definitions for air pollution control programs.

011 Emissions Control in the Grain and Feed Industry, Volume II: Emission Inventory, EPA-450/3-73-003b, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, September 1974.

Source/Pollutant Key: P 2

Information provided by Volume I of the study served to identify emission sources within the grain and feed industry, while in Volume II the information is utilized to prepare an emission inventory and project emissions for years 1975 and 1980. The methodology employed includes: identification of operations within each segment of industry; determination of production rates and portion of rate associated with specific operations; evaluation of Volume I data and selection of emission factors; application of control and calculated efficiencies; and calculation of annual emissions. Sources include: grain elevators, feed mills, alfalfa dehydration plants, wheat mills, rye mills, dry corn mills, oat mills, rice mills, soybean and wet corn mills.

012 Airport Emission Inventory Methodology, EPA-450/3-75-048, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, December 1974.

Source/Pollutant Key: A 1

This report describes a methodology for performing emission inventories at airports, with a specific focus on the St. Louis AQCR. This work was performed in support of EPA's RAPS program. The report details available data and techniques, and outlines how to refine methodologies for inventorying emissions from municipal, civilian and military airports. Sources include aircraft operations, engine maintenance testing, ground support vehicles, and fuel storage and handling. A discussion of factors and their interrelationships with respect to airport emissions is also presented and a methodology summary provided to show computation of emissions from the St. Louis AQCR airports.

013 Compilation of Air Pollutant Emission Factors, Third Edition with Supplements, AP-42, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, October 1980.

Source/Pollutant Key: S 1, S 99

Emission data obtained from source tests, material balance studies, engineering estimates, etc., have been compiled for use by individuals and groups responsible for conducting air pollution emission inventories. Emission factors given in this document, the result of the expansion and continuation of earlier work, cover most of the common emission categories: fuel combustion by stationary and mobile sources; combustion of solid wastes; evaporation of fuels, solvents, and other volatile substances; various industrial processes; and miscellaneous sources. When no source test data are available, these factors can be used to estimate the quantities of primary pollutants (particulates, CO, SO_2, NO_x, and hydrocarbons) being released from a source or source group.

Information on the availability of future supplements to Compilation of Air Pollutant Emission Factors can be obtained from the Environmental Protection Agency, Library Services, MD-35, Research Triangle Park, NC 27711 (Comm. Telephone: 919-541-2777, FTS: 629-2777).

Comments and suggestions regarding this document should be directed to the attention of Director, Monitoring and Data Analysis Division, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC 27711.

014 Procedures for Emission Inventory Preparation, Volume I: Emission Inventory Fundamentals, EPA-450/4-81-026a, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, September 1981.

Source/Pollutant Key: S 99

This volume is the first of a five-volume series designed to assist personnel of air pollution control agencies in preparing and maintaining emission inventories. Volumes II, III, and IV address specific areas of the inventory process, namely the preparation of inventories of point, area, and mobile sources, respectively; the fifth volume is a bibliography of pertinent publications relating to inventorying activities. Emphasis in this series is placed on a systematic approach to identifying emission data requirements and sources; collecting and processing the required information; and presenting the data in a format consistent with the intended application of the inventory. Although specific procedures for preparing the emission inventory are provided whenever possible, available options and the reasons for them are identified and discussed.

Specifically, this volume is presented as a reference guide for managers and planners of state and local air quality control programs. In conjunction with the other volumes, it serves as a resource for management's use in:

Planning an emission inventory,

Establishing an agency organization to carry on the emission inventory programs, and

Establishing documented procedures and quality assurance activities for emission inventory programs.

015 Procedures for Emission Inventory Preparation, Volume II: Point Sources. EPA-450/4-81-026b, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, September 1981.

Source/Pollutant Key: P 99

This document presents methods for the collection, analysis and presentation of data contained in the point source emission inventory. Emphasis is given to methods that produce annual emission estimates. However, attention is devoted to preparing an annual inventory of emissions that can be adjusted to seasonal or daily temporal levels. Problems encountered in inventorying major source categories and solutions to them are provided in the final chapter. The appendices contain copies of questionnaires and associated process and emission information that have been developed by EPA for the purpose of preparing a point source inventory.

016 Procedures for Emission Inventory Preparation, Volume III: Area Sources, EPA-450/4-81-026c, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, September 1981.

Source/Pollutant Key: A 99

The purpose of this report is to assist the user in identifying area source categories and relevant sources of data that can be used to estimate emissions from these categories. Methods for the development of the inventory of area sources are provided for the following major source categories:

Combustion Sources,

Solid Waste Incineration and Open Burning Sources,

Fugitive Dust Sources, and

Volatile Organic Compound (VOC) Sources.

In each chapter, the data requirements for establishing emission levels are presented along with the available data sources. Validation methods and cross checks which are available to assess data accuracy and to establish the reliability of the inventory are also delineated.

017 Procedures for Emission Inventory Preparation, Volume IV: Mobile Sources, EPA-450/4-81-026d, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, September 1981.

Source/Pollutant Key: M 99

This document focuses on the technical aspects of inventorying emissions from mobile sources. More specifically, the document presents an overview of the mobile source category as a whole and identifies specific methods that can be used to identify and inventory sources, estimate emissions, and establish and maintain a useful, current mobile source inventory file. The mobile source category is described in terms of the individual sources included, the significance of each source with respect to the mobile source category, the relative significance of the entire mobile source category with respect to other emission sources, and a general indication of the methods used to develop the inventory. Specific methods are presented for use in deriving emission estimates for the following mobile source subcategories:

Off-highway Vehicles,

Highway Vehicles,

Aircraft,

Railroad Locomotives, and

Vessels.

018 Guidelines for Air Quality Maintenance Planning and Analysis, Vol. 2: Plan Preparation, EPA-450/4-74-002, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, July 1974.

Source/Pollutant Key: S 99

This document provides the guidance and information for the preparation of air quality maintenance plans for areas which have the potential to exceed the National Ambient Air Quality Standards because of present air quality or projected growth. The plan preparation includes: time scheduling; intergovernmental cooperation; maintenance strategy development; AQMP preparation and assembly; and plan revision and review. Procedures for projecting air quality through 1985 and identifying any potential air quality maintenance problems are provided in the report.

019 Guidelines for Air Quality Maintenance Planning and Analysis, Vol. 7: Projecting County Emissions, EPA-450/4-74-008, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, September 1974.

Source/Pollutant Key: S 99

The procedures for estimating air pollutant emissions from point and area sources within a county or a small localized area as well as forecasting future air pollution emissions are presented. Future emissions are determined by the levels of activity and the estimated economic and demographic growth. Forecasting procedures include determination of baseline emission levels, estimation of growth patterns, and definition of the relationship between activity levels and actual emissions produced. Procedures for NEDS files updating and emission projections are also included.

020 Development of HATREMS Data Base and Emission Inventory Evaluation, EPA-450/3-77-011, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, April 1977.

Source/Pollutant Key: S 7, S 99

This report presents the results of an extensive data collection and analysis program which was conducted to (a) develop an emission factor data base for HATREMS; (b) prepare this data for loading into HATREMS; and (c) evaluate emission inventory information for HATREMS. HATREMS is a computerized subsystem of EPA's AEROS. HATREMS stores and reports source and emission data for noncriteria pollutants in a manner parallel to NEDS which stores and reports data for the five criteria pollutants. Three hazardous pollutants (lead, fluorides, and HCl/chlorine) are treated in detail, and special report chapters which present emission factors for these pollutants are included as appendices to this report.

021 Evaluation of Emission Inventory Methodologies for the RAPS Program, EPA-450/3-78-008, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, January 1978.

Source/Pollutant Key: S 99

The general objective of the work described in this report was to evaluate and quantify the methodology developed and used for the Regional Air Pollution Study (RAPS) emission inventory. Improved emission methodologies were one of the RAPS objectives. However, they were also essential to the realization of one of the other principal objectives--namely, the evaluation of mathematical air quality simulation models. The thrust of this work was to evaluate individual emission models and relate them to their application to air quality models.

022 A Regional Air Pollution Study (RAPS): Preliminary Emission Inventory, EPA-450/3-74-030, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, January 1974.

Source/Pollutant Key: S 99

An operational methodology to provide emission data for the St. Louis RAPS is described in this report. This report also presents existing emission inventories for the St. Louis area and reviews other emission inventory models. The methodology presented identifies tasks and objectives required by the inventory to ascertain the users and uses of the emission data in the RAPS program, to specify the content and nature of the emission inventory, and to specify data formats and data handling.

023 Particulate Control for Fugitive Dust, EPA-600/7-78-071, U.S. Environmental Protection Agency, Research Triangle Park, NC, April 1978.

Source/Pollutant Key: S 2

This report discusses fugitive emissions from major sources and methods of control. Emission factors are presented for the following sources:

Agricultural Tilling,

Construction Activity,

Stockpile and Waste Heap Data Base,

Unpaved Roads, and

Reentrained Street Dust.

It was concluded that fugitive dust sources are significant emitters of particulates in a majority of the AQCRs. Of the 150 AQCRs that do not meet the TSP standards, fugitive dust emissions exceed point source emissions in 139, or 92 percent. In fact, fugitive emissions are 10 times greater than point source emissions in 58, or 39 percent, of the AQCRs. In most cases, unpaved roads provide the largest source of particulate emissions in the AQCRs. Agricultural tilling and construction sources are also very important and in some cases are the largest emitters.

Control effectiveness for fugitive sources is highly variable and depends on such things as type of control, characteristics of the source, local climatic conditions, and source activity. Present control technology for unpaved roads, agricultural tilling, and construction activity is inadequate.

024 Particulate Emission Factors Applicable to the Iron and Steel Industry, EPA-450/4-79-028, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, August 1979.

Source/Pollutant Key: P 2

This report represents the combined efforts of EPA and steel industry experts to establish reasonable particulate emission factors with ranges for all known stack and fugitive sources within an integrated steel mill.

An intensified effort was made to update the iron and steel industry particulate emission factors presented in AP-42 and to add, for the first time, fugitive source emission factors. The report is divided into three major areas. First, background information related to the processes in the iron and steel industry, along with a process flow chart, is presented. Second, all of the particulate source test data are presented and summarized in chart form. Third, the methodology for selecting single source-specific emission factors and the resulting particulate emission factors are identified.

025 Regional Air Pollution Study: Noncriteria Pollutant Inventory, EPA-600/4-77-018, U.S. Environmental Protection Agency, Research Triangle Park, NC, April 1977.

Source/Pollutant Key: P 7

The Clean Air Act mandates the achievement of air quality standards established for the criteria pollutants as a goal. Other substances are also released which affect the air quality. This report describes the inventory of noncriteria pollutants from point sources using information from the NEDS inventory for the St. Louis AQCR. The assessment of emissions of 21 noncriteria pollutants from 1300 point sources; information concerning the pollutants; and data for grid square, county, state, or AQCR analysis are presented.

026 Environmental Assessment Data Systems: Systems Overview Manual, EPA-600/8-80-005, U.S. Environmental Protection Agency, Industrial Environmental Research Laboratory, Research Triangle Park, NC, January 1980.

Source/Pollutant Key: S 99

The Environmental Assessment Data System (EADS) is a group of independent computerized data bases which are interlinked to provide common accessibility to data produced by a variety of EPA projects. RTP's Environmental Assessment programs are expected to be heavy contributors and users. Accordingly, the EADS has been structured in a manner such that EA data can easily be transferred to the input forms. However, the structure is flexible and comprehensive enough so that data from virtually any pollutant sampling and analysis protocol could be included. The EADS is intended to accept data from either energy systems or industrial processes. Often times these data are multimedia in nature; that is, the data include fine particles, gaseous, liquid and solid discharge streams, or any combination, emanating from one source.

Because pollution controls are developed on a media/pollutant basis, EADS must be a media-specific data base system. Thus, the EADS is composed of four independent data bases: the Fine Particle Emissions Information System (FPEIS), the Gaseous Emissions Data System (GEDS), the Liquid Effluent Data System (LEDS), and the Solid Discharge Data System (SDDS). While independent, the four data bases are very similar in structure and are interlinked. Interlinking is necessary to enable a control strategy analyst or an R&D program planner to select the most environmentally acceptable control methods on a systems basis.

027 Regional Air Pollution Study: Point Source Methodology and Emission Inventory, EPA-600/4-78-042, U.S. Environmental Protection Agency, Research Triangle Park, NC, July 1978.

Source/Pollutant Key: P 3, P 99

The RAPS study was undertaken to validate atmospheric dispersion models that predict ambient air concentrations on an hourly basis. Hourly measurements of SO_2 concentrations were collected over a period of 2 years to form a data base as a requirement of this study. Ultimately, measurements of other criteria pollutants were included in the data base. This report also discusses the approach to assembling a "precision" inventory for the St. Louis AQCR using EPA's Weighted Sensitivity Analysis Program to limit the scope of the work. Data acquisition and preparation for entry into a data bank are discussed as well.

028 Emissions Inventory in the SURE Region, Research Project 862-5, Electric Power Research Institute, Palo Alto, CA, July 1978.

Source/Pollutant Key: S 2, S 3, S 5, S 6

The Electric Power Research Institute sponsored a major air pollution monitoring and modeling study which included the Eastern United States and parts of Southern Canada. The primary purpose of the Sulfate Regional Experiment (SURE) program was to define the physical and chemical mechanisms which link emissions of sulfur oxides (SO_x), total emitted particulates (TEP), nitrogen oxides (NO_x), and hydrocarbons (HC) to ambient concentrations of SO_2 and sulfates. A major goal of the SURE program was to develop a useful air quality model to relate emissions to ambient sulfur oxide and sulfate levels over distances of 1,000 km.

This report describes one phase of the SURE program and consists of the development of a detailed emission inventory. Source parameters such as location, stack height, flue gas temperature, etc. were defined for major sources, and emission estimates for manmade sources were developed for the following pollutants: SO_2; SO_4; NO; NO_2; low, moderate and high reactivity hydrocarbons; and total emitted particulates.

The compilation of accurate hourly SO_x emission estimates for utility sources during the SURE intensive measurement periods in 1977, 1978 and 1979 was emphasized. One of the crucial aspects of the emission inventory program was to provide emission data consistent with associated measurement and modeling activities.

029 Implementation and Coordination of the Sulfate Regional Experiment (SURE) and Related Research Programs, Research Project 862-2, Electric Power Research Institute, Palo Alto, CA, October 1977.

Source/Pollutant Key: S 2, S 3, S 5, S 6

An overview of the SURE program is presented in this report. The specific objectives of the SURE were to:

Establish a regional air quality data base through measurement of several parameters at the ground and aloft with specified accuracy and precision;

Establish the location and magnitude of emissions occurring during the air quality measurement period with specific accuracy and precision;

Derive a quantitative method for relating emissions from the electric power industry to regional ambient air quality as measured by sulfur dioxide (SO_2) and particulate sulfate to establish the relative importance of emission density distribution, meteorology, chemical transformations and removal processes to the regional occurrence of sulfur and nitrogen oxides (SO_x and NO_x);

Define the circumstances that govern the shape, location, and duration of zones influenced (Zones of Influence) by a combination of emissions from large point sources or a cluster of sources; and

Determine the applicability of readily measurable air quality parameters as surrogates for establishing the origins of the suspended particulate complex (SPC) and for quantifying various chemical species produced in the atmosphere.

030 Assessment of Fugitive Particle Emission Factors for Industrial Processes, EPA-450/3-78-107, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, September 1978.

Source/Pollutant Key: P 2

The U.S. EPA has called for the revision of SIPs for areas where SIP standards have been exceeded. The purpose of this report was to develop a priority lisiting of fugitive industrial processes for which source sampling is needed. Industrial processes covered in the assessment are those which contribute to fugitive particulate emissions. The criteria used to evaluate the listing were based on adequacy of available fugitive emission factor data and total potential uncontrolled fugitive particulate emissions. The factors were evaluated for adequacy for inclusion in AP-42. The appendix contains emission factors suitable for input into AP-42, and particle size information.

031 Guideline for Development of Control Strategies in Areas with Fugitive Dust Problems, EPA-450/2-77-029, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, October 1977.

Source/Pollutant Key: A 2, A 99

The purpose of this document is to outline a methodology for the development of control strategies for nonattainment areas with fugitive dust problems. This document synthesizes the results of dust control methods and establishes a procedural method for the development of air programs to control high total suspended particulates. Discussions of the representativeness of monitoring sites, the compilation of emission inventories for the base year and projected inventories, and the formulation of a model to translate emission levels into suspended particulate concentrations are included. Procedures for the evaluation of appropriate control strategies, including consideration of control effectiveness, air quality impact, costs, and implementation problems, are discussed as well.

032 Procedures for the Preparation of Emission Inventories for Volatile Organic Compounds, Volume II, Emission Inventory Requirements for Photochemical Air Quality Simulation Models, EPA-450/4-79-018, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, September 1978.

Source/Pollutant Key: S 6, S 99

This volume describes procedures for compiling VOC emission inventories in sufficient detail for use in photochemical air quality simulation models. Because photochemical models can simulate the hour-by-hour photochemistry occurring over numerous, small subcounty areas (i.e., grid cells), more temporal and spatial resolution of input data must be included in the inventories that provide emission data to these models. In addition, total VOC (and NO_x) emissions must be apportioned into species classes, and information may be required on other pollutants such as carbon monoxide, sulfur dioxide, and particulates. Methodologies for providing this added detail are presented in this document.

033 Hydrocarbon Control Strategies for Gasoline Marketing Operations, EPA-450/3-78-017, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, April 1978.

Source/Pollutant Key: S 6, S 99

This informational document provides basic and current descriptions of gasoline marketing operations and methods that are available to control hydrocarbon emissions from these operations. The three types of facilities that are described are terminals, bulk plants, and service stations. Operational and business trends are also discussed. Emissions from typical facilities, including transport trucks, are estimated.

The operations which lead to emissions from these facilities include (1) gasoline storage, (2) gasoline loading at terminal and bulk plants, (3) gasoline delivery to bulk plants and service stations, and (4) the refueling of vehicles at service stations.

Available and possible methods for controlling emissions are described with their estimated control efficiencies and costs. The costs for control of a unit weight of hydrocarbons are calculated from these estimates.

This report also includes a bibliography of references cited in the text, and supplementary sources of information.

034 End Use of Solvents Containing Volatile Organic Compounds, EPA-450/3-79-032, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, May 1979.

Source/Pollutant Key: S 6, P 6, A 6

Emissions of volatile organic compounds (VOC) are one of the major targets of the control programs being developed by the EPA Office of Air Quality Planning and Standards. Organic solvents are a major part of these emissions. Knowledge of the end uses of these solvents provides an important clue as to the ways in which solvents are emitted to the atmosphere. The objective of this project was to determine total domestic solvent consumption and to provide as complete an end use breakdown of this consumption as possible.

Recently published information on production and end uses of individual solvents was reviewed in the initial phase of the project. When this published information was found to be incomplete, it was supplemented through interviews with solvent producers and marketers. A rapid laboratory method for determination of the approximate solvent content in consumer products was developed to complement the findings of the solvent survey. The method was applied to products from 16 product categories.

The solvent survey provided information about major uses for major solvents. The information on those end uses in which solvents are used in minor quantities was frequently not available. This unidentified solvent consumption was determined by subtracting the total identified consumption from the total quantity of solvent produced. Adjustments were made for the nonsolvent uses in which the compounds are chemically modified (e.g., chemical raw materials, fuels, etc.). The methods used for determination of unidentified solvent consumption are described.

035 Development of the Area Source Emission Inventory for the 1982 Ozone State Implementation Plan for the Chicago Metropolitan Region of Illinois and Indiana, Contract No. 81C-279, Northeastern Illinois Planning Commission, Chicago, IL, December 1980.

Source/Pollutant Key: A 5, A 6, A 99

A VOC and NO_x area source emission inventory was developed for the entire Chicago ozone nonattainment area. The nonattainment area includes Cook, DuPage, Kane, Lake, McHenry, and Will counties in Illinois, and Lake and Porter counties in Indiana. The base year of the inventory is 1980 and the projected attainment year is 1987. To the greatest extent possible, the methods used in developing this inventory are consistent with the EPA's guidance documents: Procedures for the Preparation of Emission Inventories for Volatile Organic Compounds and Final Emission Inventory Requirements for 1982 Ozone State Implementation Plans. Other objectives included: temporally distributing emissions to derive typical ozone season weekday emissions in kilograms/day, taking into account regulatory measures adopted by the States of Illinois and Indiana, and in effect by December 31, 1980, separating exempt from nonexempt solvent emissions, and computerizing the inventory into Emission Inventory System/Area Source (EIS/AS) format.

036 Quantification of Dust Entrainment from Paved Roadways, EPA-450/3-77-027, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, July 1977.

Source/Pollutant Key: A 2

This report presents the results of a field testing program to develop emission factors for fugitive dust entrainment from paved urban roads. Substantial evidence has been compiled which indicates that dust emissions from city streets are a major cause of nonattainment of national air quality standards for total suspended particulates (TSP). Therefore, the quantification of this source is necessary to the development of effective attainment and maintenance strategies.

Field testing was conducted at representative sites in the Kansas City area. At one location, controlled amounts of pulverized top soil and gravel fines were applied to the road surface. The basic measurements consisted of isokinetic exposure and concentration profiles of airborne dust, particle size distributions, dust deposition profiles, surface dust loadings, and traffic characteristics. In addition, conventional high-volume samplers were used to determine attenuation of TSP concentration with distance from the source.

Emissions were found to vary directly with traffic volume and surface loading of silt (fines). The dust emission factor for normally loaded urban streets ranges from 1 to 15 g/vehicle-km, depending on land use.

037 Emissions Forecasting Methodology, PB 238 259, State of California, Air Resources Board, Sacramento, CA, July 1974.

Source/Pollutant Key: S 1, S 99

A methodology for forecasting emissions for any future year is described. Techniques and specific emission factors for 1975, 1985, and 1995 are given for both mobile and stationary sources. Motor vehicle emissions are based on the CVS-2 test cycle and a data base specific for California. A discussion of current and developing approaches and driving cycles used to quantify motor vehicle emissions is presented including a discussion of speed adjustment factors. Stationary sources are divided into power plants and other stationary sources; power plant emissions are based on projections of electrical energy generation, and other stationary source emissions are based on normalized projections of total earnings by source category (e.g., petroleum refining, mineral extraction). The base year for stationary source emissions is 1972.

038 Control Techniques for Lead Air Emissions, Volume I, EPA-450/2-77-012, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, December 1977.

Source/Pollutant Key: S 7

Emission factors for lead were developed for each source category; they are based on source tests, particulate chemical analyses in the literature, industry responses, material balances, and engineering judgment. Because data in the literature are limited, most of the emission factors should be regarded as approximations.

The overall control device collection efficiencies for lead were assumed equivalent to those for collection of nonlead particulates. This assumption has been verified by limited EPA source tests on fabric filters. For ESPs and wet scrubbers, some recent information indicates differences in the collection efficiency between particulates and lead. Lead compounds are probably less efficiently removed by ESPs and wet scrubbers whenever lead emissions are concentrated in the very fine particulate sizes.

039 Emission Study of Industrial Sources of Lead Air Pollutants, 1970, APTD-1543, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, April 1973.

Source/Pollutant Key: P 7

This emission study was conducted to investigate and determine the extent of industrial lead emissions to the atmosphere in the U.S. during the year 1970. Background information about the lead industry has been included with some process descriptions which are limited to or are closely related to lead emissions. Lead data and lead emission factors presented in the report are based on information from industrial sources and field trips to inspect air pollution control systems. The primary uses and sources of lead are described.

040 Emission Inventory Requirements for 1982 Ozone State Implementation Plans, EPA-450/4-80-016, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, December 1980.

Source/Pollutant Key: S 5, S 6, S 99

This guidance document describes the emission inventory requirements related to preparation and submission of 1982 Ozone State Implementation Plans for those states which requested and have been granted an extension beyond July 1982 of an attainment date for the National Ambient Air Quality Standard for ozone. Addressed in the document are emission inventory requirements relating to geographic area of coverage, point source cutoff size specifications, pollutants of interest, data reporting formats, documentation requirements, quality of data base, years to be addressed, and specific inventory techniques to be employed.

041 1977 National Emissions Report, EPA-450/1-80-005, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, March 1980.

Source/Pollutant Key: S 99

This report summarizes, by source category, estimates of emissions in 1977 of those air pollutants for which national standards have been promulgated. These pollutants, which are called criteria pollutants, are particulates, sulfur oxides (SO_x), nitrogen oxides (NO_x), hydrocarbons (HC), and carbon monoxide (CO). National Emissions Reports, which are a series of annual reports, are compiled from information contained in the National Emissions Data System (NEDS) on emission sources. Compilations of emission data are presented for the nation as a whole, for individual states, for intrastate Air Quality Control Regions (AQCRs), for respective state portions of interstate AQCRs, and for interstate AQCRs.

This report represents the best available indicators of national emissions for the calendar year 1977. More detailed emission summary reports for the nation, each state, and AQCR, based on NEDS data, are given in the body of the report. The estimates reported are based on emission-source records contained in NEDS as of February 1980. State-submitted Annual Reports that were successfully updated in accordance with NEDS files prior to this date also are included. Thus, the data are generally comparable to data collected for the development of State Implementation Plans (SIPs), but include revisions and updated information where they are available. Text sections provide a detailed technical description of the procedures that were used to develop the emission data.

042 Emission Inventory/Factor Workshop, Volumes I and II, EPA-450/3-78-042a-b, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, May 1978. Proceedings of Emission Inventory/Factor Workshop, co-sponsored by the Air Pollution Training Institute and Air Management Technology Branch, Raleigh, NC, September 13-15, 1977. (Abstracts of some of the 25 papers are also listed separately in this section.)

Source/Pollutant Key: S 6, S 99

Major components of an air pollution control program are emission inventories and emission factors which allow air pollution control agencies to plan strategies for the control of emissions. On September 13-15, 1977, a workshop hosted by the Office of Air Quality Planning and Standards was held in Raleigh, NC to discuss emission inventories and emission factors related to organic emissions. This document is comprised of the papers presented and the ensuing discussions. Twenty-five papers concerning emission inventories are contained in the two volumes. Authors represented EPA, state air pollution control agencies, and private industry.

043 Methodology for Inventorying Hydrocarbons, EPA-600/4-76-013, U.S. Environmental Protection Agency, Research Triangle Park, NC, March 1976.

Source/Pollutant Key: P 6, P 99, A 6, A 99

A methodology for estimating emissions of hydrocarbons to the atmosphere is described, with emphasis on emissions from stationary point and area sources. The methodology is an elaboration of the National Emissions Data System (NEDS), and is based upon, but not limited to, an inventory of hydrocarbon emissions within the Boston, MA, Air Quality Control Region; emissions from motor vehicles are not considered, since they are subject to a different methodology. Sources of data and procedures to obtain data are described. Data sources include trade associations, census figures, and wholesale suppliers. Examples are given of work sheets for compiling data, and of questionnaires with instructions for completion that can be sent to potential emission sources. Application of the methodology to the St. Louis Air Quality Control Region for development of a hydrocarbon emission inventory for the Regional Air Pollution System is outlined.

044 Determination of Percentage of Vehicles Operating in the Cold-Start Mode, EPA-450/3-77-028, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, August 1978.

Source/Pollutant Key: M 1

Estimates of the percentages of vehicles operating in the cold start mode are made for 60 locations in the Pittsburgh and Providence regions. Cold start percentages are presented for the morning commuter hours, the midday period, the evening commuter hours, and the evening and early morning off-peak periods. The percentage was found to be highly variable, depending on both location and time period. The cold mode percentages found were different from those assumed in the Federal Test Procedure. An attempt was made to generalize these results, with suggested ranges of values presented for various times and locations.

045 User's Manual for the APRAC-2 Emissions and Diffusion Model, Stanford Research Institute, Menlo Park, CA, June 1977.

Source/Pollutant Key: M 1, M 99

The computer program for a completely revised version of the APRAC-1A diffusion model is presented and discussed. The new code uses EPA's emission calculation methodology from AP-42. Gridded and link-by-link emissions can be output for hydrocarbons, carbon monoxide, or oxides of nitrogen. Diffusion calculations make use of a receptor-oriented Gaussian plume model. Local winds at the receptor can be used; they are interpolated from multiple wind inputs. Mixing heights can be calculated from sounding data or can be input directly. Two local source models are available, one treating pollutant behavior in a street canyon and the other treating vehicle and pollutant effects at a signalized intersection. A small program is included for decoding Federal Highway Administration data tapes.

046 Bartosh, C. P., W. J. Moltz, and B. P. Cerepuka, "Organic Emission Inventory Considerations and Purposes," Emission Inventory/Factor Workshop, Volume I, EPA-450/3-78-042a, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, May 1978, pp. 1-1 to 1-14. (See abstract 042.)

Source/Pollutant Key: S 6, S 99

The evaluation of the causes of ambient levels of ozone and oxidants and the development of control strategies are difficult due to the diversity of sources and the varying characteristics of organic compounds. A basic approach in defining some of the factors involves the determination of the quantity, location, and sources of hydrocarbon emissions. This paper defines the preliminary considerations of a hydrocarbon emission inventory which include: determination of the need for an emission inventory, requirements of the inventory, and constraints of the inventory preparation.

047 Computer Programs for Urban Transportation Planning, PLANPAC/BACKPAC, General Information Manual, U.S. Department of Transportation, Federal Highway Administration, Washington, DC, April 1977.

Source/Pollutant Key: M 1, M 99

The PLANPAC package of computer programs is described in this manual. This package contains models to carry out traditional transportation planning and analysis: trip generation, trip distribution, mode split, and traffic assignment. Auxiliary models are also included. For each model, the complete program and instructions on its use are presented.

048 Henderson, David C., "Documentation of Emission Inventories in Region IX," Emission Inventory/Factor Workshop, Volume I, EPA-450/3-78-042a, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, May 1978, pp. 3-1 to 3-14. (See abstract 042.)

Source/Pollutant Key: S 6, S 99

To ensure that emission inventories being developed are prepared using current emission factors and are fully documented, U.S. EPA Region IX instituted a program to provide inventory guidance to state and local agencies and to evaluate the completeness of the inventories. This paper presents the problems encountered by the regional office in dealing with incomplete inventories and discusses the minimum criteria for documenting an inventory. These criteria include: reasons the inventory was compiled, differences from previous emission inventories, description of data sources, documentation of the copies of questionnaires used in surveys, and the documentation of emission factors. Sufficient documentation of supportive information should be provided so that a third party can determine how emission estimates were derived. A summary of documentation requirements is included in the text.

049 Trapasso, J. A., and W. K. Duval, "Methodologies and Problems Encountered in a Level 3 Multi-State/County Hydrocarbon Area Source Emissions Inventory," Emission Inventory/Factor Workshop, Volume I, EPA-450/3-78-042a, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, May 1978, pp. 4-1 to 4-26. (See abstract 042.)

Source/Pollutant Key: A 6, A 99, M 6 M 99

This paper describes the methodologies utilized and problems encountered in multi-state/county Level 3 area source emission inventories. The study discussed encompassed 47 counties in 7 states and 2 EPA regions. Area source categories included residential fuel use, commercial and institutional fuel use, industrial fuel use, incineration, open burning, transportation sources, and evaporative sources. The methodologies employed consisted of a mix of three levels of analysis and various other techniques which were subject to constraints imposed by funding, time, etc. Problems discussed include: planning considerations, surveying methodology, railroad inventory methodology, and synchronization of activities with state and local agencies.

050 Grems, C., "Air Force Emission Inventories," Emission Inventory/Factor Workshop, Volume I, EPA-450/3-78-042a, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, May 1978, pp. 5-1 to 5-14. (See abstract 042.)

Source/Pollutant Key: S 1, S 99

This paper describes the Air Quality Assessment Model (AQAM) developed by the Air Force for use in conducting air pollutant emission inventories of Air Force activities in support of environmental impact analyses. The AQAM is a complex dispersion model that combines operational data and meteorological conditions to predict downwind concentrations of five pollutants from multiple sources of various geometries. The discussion of the paper is limited to Source Inventory Program of the AQAM, and the emission factors and data sources developed for it. Military aircraft operations differ significantly from civilian usage which is considered in the AQAM. Field testing of military aircraft engine emissions are discussed, as well as emission factors specific to those engines.

051 Tate, S. R., N. L. Matthews, D. J. Ames, and R. A. Bradley, "A Format for the Storage of Area Source Emission Data," Emission Inventory/Factor Workshop, Volume I, EPA-450/3-78-042a, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, May 1978, pp. 6-1 to 6-35. (See abstract 042.)

Source/Pollutant Key: A 1, A 99

This paper describes a format developed for the computer storage of area source data with advantages over the EPA-developed National Emission Data System (NEDS). The format provides for: data fields for both spatial and temporal distribution of emissions, accommodation of a wide variety of area source information from gross estimates for major categories to detailed individual process emission estimates, and documentation of the source and reliability of emission factors and process rates. Descriptions of the structure of the storage format and each data field are presented in the paper. An outline of the area source data fields has been included.

052 Carter, E. L., and J. W. Paisie, "Maryland Special Factors and Inventory Techniques," Emission Inventory/Factor Workshop, Volume I, EPA-450/3-78-042a, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, May 1978, pp. 7-1 to 7-22. (See abstract 042.)

Source/Pollutant Key: S 6, S 99

This paper discusses the Maryland emission inventory system which consists of a master tape file of registered sources with supporting documents of data input forces. The tape contains information on individual process equipment, with the data updated on a semi-annual basis. The Registration Survey System (RSS) is a file of stationary sources above certain minimum sizes which is stored on a master tape. A discussion of the registration of process equipment, new constructions, additional constructions, modifications, replacements, or elimination of old equipment is presented. A special inventory of photochemically reactive organic material with a total inventory of organic emissions consisting of natural, mobile, and stationary sources is described. Techniques for inventorying mobile sources include traffic counts, wide area surveys, fuel sales/uses, etc. Stationary source emissions can be estimated from census data, surveys, fuel usage and other data sources. A listing of organic emissions by source category for counties in Maryland is included.

053 Finfer, E. Z., "Hydrocarbon Emissions From Households in New York and New Jersey," Emission Inventory/Factor Workshop, Volume I, EPA-450/3-78-042a, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, May 1978, pp. 9-1 to 9-20. (See abstract 042.)

Source/Pollutant Key: A 6

This paper summarizes a study conducted by EPA Region II to estimate the quantity of gaseous hydrocarbons released from household products in New York and New Jersey. Sources included in the inventory were: fluorocarbon aerosol propellants, refrigerants, organic compounds and trade name solvents, paints and thinners, cooking, domestic fuel combustion, and cigarette smoking. Emissions from thermal decomposition and evaporation were cataloged and described. Emission factors derived for hydrocarbon emissions were obtained from product use data for New York and New Jersey. Listings of organic emissions in tons per year for various compounds are included.

054 Weins, F. J., Reactive Organic Gas Emissions From Pesticide Use in California, PD-77-002, California Air Resources Board, December 1977. (Also in Emission Inventory/Factor Workshop, see abstract 042.)

Source/Pollutant Key: A 6

The identification of a major source of reactive organic emissions from pesticide usage in agricultural areas in California is discussed in this report. The goals and objectives of the study were: to obtain factual data in order to quantify actual emissions to improve the methodology for inventorying reactive organic gases from pesticide usage, to assess existing inventory methodologies, and to determine inadequacies of current inventories. The amounts of pesticide materials and their volatility and reactivity are also discussed.

055 Alexander, J. T., Jr., "Emission Inventory of Petroleum Storage and Handling Losses (A Case History)," Emission Inventory/Factor Workshop, Volume II, EPA-450/3-78-042b, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, May 1978, pp. 18-1 to 18-29. (See abstract 042.)

Source/Pollutant Key: P 6, A 6

Gasoline and distillate products emissions were calculated for the Northern Virginia sector of Metropolitan Washington for the peak oxidant month of July using factors adjusted for specific July weather conditions. Sources included floating roof and fixed roof storage, bulk terminal loading racks, service station delivery and sales, airports, and small bulk plants. Calculations were made for peak periods under summer conditions using emission factors developed in a previous study. Empirical equations, from EPA publications AP-42 and AP-40, of evaporative losses were found to be inadequate, thereby necessitating the use of new factors. The emission estimates of evaporative losses for an inventory conducted in July 1976 were compared to an inventory for July 1972. Data tables were provided detailing meteorological conditions, storage tank sizes, bulk terminal emission factors, loading rack emission factors, service station emission factors, peak period conversions, total hydrocarbon evaporative emissions, and effects of vapor control measures.

056 Norton, R. L., and R. J. Bryan, "Inventorying Hydrocarbon Emissions From Small Gasoline Bulk Plants," Emission Inventory/Factor Workshop, Volume II, EPA-450/3-78-042b, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, May 1978, pp. 19-1 to 19-39. (See abstract 042.)

Source/Pollutant Key: P 6

This paper describes the technique used to inventory hydrocarbon emissions for nearly 400 gasoline bulk plants in the San Joaquin Valley and San Diego County AQCR, Houston/Galveston AQCR, Baltimore/Washington, DC AQCR, and the Metropolitan Detroit AQCR. Updated throughput information and complete inventories of bulk plant operations were obtained. Emission estimates were generated for potential as well as controlled hydrocarbon losses within each survey region. This paper describes the emission factors used and the methodology for presenting the emission estimates. This study was performed to determine whether Federal vapor recovery regulations needed revision. Survey techniques to inventory the 400 bulk plants, emission estimate formulations, and problems associated with information gathering are discussed. Summary data tables are included in the report.

057 Taback, H. J., T. W. Sonnichsen, N. Brunetz, and J. L. Stredler, "An Organic Species Emission Inventory for Stationary Sources in the Los Angeles Area - Methodology," Emission Inventory/Factor Workshop, Volume II, EPA-450/3-78-042b, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, May 1978, pp. 20-1 to 20-49. (See abstract 042.)

Source/Pollutant Key: P 6

An inventory of gaseous organic emissions from stationary sources was conducted in the California South Coast Air Basin to provide detailed data for modeling photochemical formation, and to provide information on which to base control strategy development. Emission profiles were developed in this inventory for 200 sources through a comprehensive field sampling and laboratory GC-MS analysis program, with the identification of up to 30 different organic species. The work performed for this study was to provide new information, check validity of existing data, and update existing data to reflect current trends. Descriptions of data sources, data management, methodology for compiling emission profiles, and emission factors were included.

058 Zimmerman, P., "Procedures for Conducting Hydrocarbon Emission Inventories of Biogenic Sources and Some Results of Recent Investigations," Emission Inventory/Factor Workshop, Volume II, EPA-450/3-78-042b, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, May 1978, pp. 25-1 to 25-32. (See abstract 042.)

Source/Pollutant Key: A 6

This report details a study performed by Washington State University Air Pollution Research Section to develop a technique for the evaluation of natural organic emissions. This study developed the following techniques: a standardized sampling and analytical methodology, emission factors for a limited number of species, standardized emission inventory methods, and preliminary nationwide emission estimates. Procedures for sampling and analysis, preparation of an emission inventory, and listings of average raw emission rates for selected samples are included. Discussions of hydrocarbons, terpene emissions, and natural and anthropogenic sources are presented.

059 How to Pattern the Transportation Portion of Your State Air Quality Implementation Plan, DOT/FHWA 6/80, Technical Guidance of the U.S. Department of Transportation, Federal Highway Administration, and the U.S. Environmental Protection Agency, June 1980.

Source/Pollutant Key: M 1, M 99

This manual describes available techniques for completing technical air quality planning tasks necessary for the preparation of the SIPs. Techniques are presented for developing emission inventories for highway vehicles. Nonhighway emissions are also covered, in somewhat less detail. Methods to determine nonhighway emission growth, background emission levels, and intercity transportation of pollutants are also discussed. Models for converting emissions into air quality concentrations are described, and procedures for calculating emission reduction benefits for transportation control measures are presented. Examples are included in the Appendices.

060 Control Techniques for Carbon Monoxide Emissions, EPA-450/3-79-006, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, June 1979.

Source/Pollutant Key: S 4

This control techniques document was written in compliance with Section 108(c) of the Clean Air Act which requires the Administrator to review and, where appropriate, modify and reissue any air quality criteria or information on control techniques. Thus, this document represents an updated and expanded version of AP-65. It includes information on significant stationary sources of carbon monoxide emissions as well as available methods for control of carbon monoxide emissions from mobile sources.

This document characterizes carbon monoxide emission sources and controls for use by states in revising State Implementation Plans (SIPs). It is intended for use by state and local air pollution control engineers to provide basic available information on carbon monoxide emissions from mobile sources, stationary combustion sources, and industrial process sources. Both demonstrated and feasible control strategies are presented for each source. Information is also provided on emission reduction benefits, energy requirements of controls, and annualized and operating costs of controls.

061 Friesen, R., R. Menebroker, and D. Saito, VOC Emissions From Architectural Coatings, California Air Resources Board (CARB), 1975.

Source/Pollutant Key: A 6

By using the data in this paper, estimates can be made of Volatile Organic Compound (VOC) emissions from the use of architectural coatings and associated solvents. These emissions contribute significantly to air pollution in California. In an effort to reduce these emissions, the staff of the California Air Resources Board (CARB) developed a model rule to regulate the solvent content of architectural coatings. Essential to the development of the model rule was a data base. This data base was established by use of responses to questionnaires that were mailed to coatings manufacturers. These responses provided data on the sales volume of coatings and solvents and the VOC content of these coatings and solvents for a given year, 1975. With these data, the CARB staff determined the level of VOC emissions in California for 1975. In addition, by dividing the level of VOC emissions by the 1975 population of California, the CARB staff has devised a method to estimate VOC emissions when sales data are not known. Thus, two methods of computing VOC emissions are given in this document and, for each method, the effect of the model rule is shown.

062 Compilation of Air Pollutant Emission Factors: Highway Mobile Sources, EPA/460-3-81-005, U.S. Environmental Protection Agency, Office of Mobile Source Air Pollution Control, Ann Arbor, MI, March 1981.

Source/Pollutant Key: M 1, M 99

This document summarizes the emission factors and calculation methodologies used in the MOBILE2 computer program. The emission factors are presented for eight individual vehicle types in three regions of the country. The document describes the basic test procedures used to collect HC, CO, and NO_x emissions and the generalized emission factor calculation equations. The emissions presented include basic exhaust emissions, crankcase and evaporative HC emissions, January 1 basic exhaust emission levels, and idle exhaust emissions. Nonmethane HC fractions and particulates are also presented. Emission correction factors are presented to adjust emissions for various ambient and vehicle usage conditions such as speed, temperature, and humidity.

063 User's Guide to MOBILE2 (Mobile Source Emissions Model), EPA-460/3-81-006b, U.S. Environmental Protection Agency, Office of Mobile Source Air Pollution Control, Ann Arbor, MI, March 1981.

Source/Pollutant Key: M 99

This guide presents documentation on EPA's MOBILE2 program, which calculates composite emission factors for hydrocarbons, carbon monoxide, and oxides of nitrogen from motor vehicles, using the methodology and factors presented in "Compilation of Pollutant Emission Factors for On-Highway Mobile Sources." The program calculates the emission factors based on year, speed, ambient temperature, vehicle type and age distribution, operating mode, and the presence of an Inspection and Maintenance program. All these factors can be input directly to represent local conditions, or national averages already built into the program can be used. New emission factors can also be input at the user's discretion.

064 Fugitive Emissions From Integrated Iron and Steel Plants, EPA-600/2-78-050, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, March 1978.

Source/Pollutant Key: P 2

This report is the result of an engineering study of fugitive emissions from iron and steel industries. The objectives of the investigation were: the identification of fugitive emission sources, a ranking of the sources based on relative environmental impact, and recommendations for future research. Fugitive emission factors for iron and steel sources were compiled from literature and from industry sources. Field sampling of particulate emissions from material handling operations was performed to develop improved emission factors for open fugitive emission sources. Devices for emission control are discussed along with evaluations of retrofitting proposed systems to existing operations.

065 An Implementation Plan for Suspended Particulate Matter in the Phoenix Area, Vol. II - Emission Inventory, EPA-450/3-77-021b, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, December 1977.

Source/Pollutant Key: S 2

This report presents an evaluation of particulate emission sources in the Phoenix, Arizona, area including a detailed methodology to derive the base year and project baseline emission estimates. Estimates were made for three major particulate emission source categories: conventional sources, anthropogenic fugitive dust sources, and wind blown fugitive dust emissions. Each major source category was organized to provide a review of previous inventories, documentation of the emission estimation procedures, and the base year emission estimates. Emissions were resolved on both a spatial and a seasonal basis. Growth and activities are evaluated to project emissions in the years 1980 and 1985. Grid maps and graphical emission maps are also presented.

066 Exhaust Emissions From Uncontrolled Vehicles and Related Equipment Using Internal Combustion Engines, Part 5: Farm, Construction and Industrial Engines, APTD-1494, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, October 1973.

Source/Pollutant Key: M 1

This report investigated exhaust emissions from heavy duty gasoline and diesel engines used in farm, construction, and industrial applications. Exhaust emissions from 12 engines were measured, including 8 diesels and 4 gasoline engines. Emissions which were measured included hydrocarbons, CO, CO_2, NO, NO_x, O_2, total aliphatic aldehydes (HCHO), formaldehyde (HCHO), and particulates.

The emission results obtained in this study, as well as data obtained from other sources, were used in conjunction with information on engine population and usage to estimate emission factors. Estimates of emission factors were made using emission data developed on as broad a range of engines as possible, taking into account that several of the engines tested (as well as others on the market) are widely used in more than one of the three areas of application treated in this report (farm, construction, and industrial). National impact was estimated separately for each of the three engine applications, based on population and usage information developed independently for each application.

067 Exhaust Emissions From Uncontrolled Vehicles and Related Equipment Using Internal Combustion Engines, Part 3: Motorcycles, APTD-1492, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, March 1973.

Source/Pollutant Key: M 1

In this report exhaust emissions from seven motorcycles were measured using three separate procedures for each bike. Those emissions which were measured included hydrocarbons, CO, CO_2, NO, NO_x, O_2, total aliphatic aldehydes (HCHO), formaldehyde (HCHO), and particulate.

The motorcycles were operated on a modified automotive chassis dynamometer, and the emission results were used in conjunction with statistics on motorcycle population and usage to estimate national emissions impact.

068 Supplementary Guidelines for Lead Implementation Plans, EPA-450/2-78-038, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, August 1978.

Source/Pollutant Key: S 7

This guideline appeared in draft form in November of 1977 and was referred to in the preamble to the proposed regulations on lead implementation plans, which appeared in the Federal Register of December 14, 1977 (42 FR 63087). This final edition reflects a number of changes from the draft version. Some significant revisions are as follows:

Revision of Section 4.3 on projecting automotive lead emissions to correct errors in the units in the equations and provide values for several expressions;

Inclusion of a new section (4.4) on air quality modeling;

Revision of Chapter 5 on siting of urban area ambient air quality monitors for lead to reflect a number of comments; and

Revision of the inorganic lead testing method that appeared in Appendix A, and the inclusion of a test method for alkyl lead, which appears as the new Appendix B.

069 Development of An Emission Inventory Quality Assurance Program, EPA-450/4-79-006, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, June 1979.

Source/Pollutant Key: S 99

Quality assurance comprises three types of procedures: standard operating procedures; procedures for finding and correcting errors and inconsistencies; and procedures for data quality assessment. Quality assurance for emission inventories focuses more attention on human error than on equipment parameters. This report presents a set of guidelines for developing an emission inventory quality assurance program which calls for identifying the inventory components, estimating the potential for errors and errors with greatest impact on inventory results, and developing techniques for the control and correction of errors. Sources of errors within emission inventory procedures are discussed and control techniques are devised to be preventive or corrective measures.

070 Manpower Planning Model, EPA-450/3-75-034, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, March 1975.

Source/Pollutant Key: S 99

This report presents a computerized manpower planning model designed to estimate the manpower requirements of non-Federal control agencies and to project the effects on manpower levels of various policy options and other decisions. This model is intended to replace a simpler model developed by DHEW-NAPCA in the late 1960's, which could not accommodate the changes and development of air pollution agencies' functions. The predictive relationships for use in the model are derived from empirical information provided by selected existing agencies: seven state agencies and two local agencies within two of the seven states. These agencies were chosen with regard to the characteristics of each agency and its jurisdiction in order to provide a balanced data set. The model presents projections for three major groups of activities: air quality monitoring, source related activities; and administrative and support activities. Emission inventory activities are encompassed by these three major groups.

071 Exhaust Emissions From Uncontrolled Vehicles and Related Equipment Using Internal Combustion Engines, Part 2: Outboard Motors, APTD-1491, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, January 1973.

Source/Pollutant Key: M 1

In this report exhaust emissions from four 2-stroke outboard motors were measured before and after being bubbled through water, and the constituents measured were: total hydrocarbons by FID; CO, CO_2, NO, and hydrocarbons by NDIR; NO and NO_x by chemiluminescence; O_2 by electrochemical analysis; light hydrocarbons by gas chromatography; and total aliphatic aldehydes and formaldehyde by the MBTH and chromotropic acid methods, respectively.

The engines tested were a Chrysler 35 hp twin, a Mercury 65 hp in-line four, and OMC twins of 4 hp and 9.5 hp. The engines were operated on stationary test stands with power absorption by electric (eddy current) dynamometers driven from the propeller shafts. Pertinent operating data were recorded along with emissions, and mass emissions computed from data gathered during this project were used in conjunction with available sales and usage data to estimate national emissions impact.

072 Technical Guidance for Control of Industrial Process Fugitive Particulate Emissions, EPA-450/3-77-010, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, March 1977.

Source/Pollutant Key: P 2, P 99

This document provided guidance for evaluating "Industrial Process Fugitive Particulate Emission" (IPFPE) sources in light of upcoming revisions to State Implementation Plans. For 24 selected industrial categories, IPFPE data are presented on identification of sources; emission estimates; example plant inventory; emission characteristics; control technology options; and a list of pertinent references.

Control technologies, including selection of control techniques, IPFPE capture and control options, and removal equipment, are presented. Techniques are developed to estimate impact of IPFPE sources on air quality. Evaluation of short-term localized impact using dispersion modeling and field measurements (upwind/downwind sampling) is discussed. In addition, state-of-the-art measurement techniques for IPFPEs are identified.

Integration of IPFPE impacts into the State Implementation Planning process is also covered. Procedures for development of control strategies for IPFPE sources are presented along with factors which influence the IPFPE planning process. The document summarizes existing regulations applicable to IPFPE sources, model regulations for IPFPE sources, and an evaluation of enforcement procedures.

073 Point and Area Source Organic Emission Inventory (RAPS), EPA-600/4-78-028, U.S. Environmental Protection Agency, Research Triangle Park, NC, June 1976.

Source/Pollutant Key: S 6

The Regional Air Pollutant Study (RAPS) program's goal is the validation of atmospheric dispersion models using emission data from emission inventories. This report details an inventory of organic emissions from stationary and mobile sources for the St. Louis Air Quality Control Region (AQCR). The inventory encompasses both point and area sources for process, combustion, and evaporative emissions. A breakdown into five hydrocarbon categories, including paraffins, olefins, aromatics, aldehydes and nonreactives, was designated for each source type.

074 Control Techniques for VOC Emissions From Stationary Sources, EPA-450/2-78-022, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, May 1978.

Source/Pollutant Key: P 6, A 6

This document is a revised and updated version of a March 1970 EPA publication entitled Control Techniques for Hydrocarbon and Organic Solvent Emissions From Stationary Sources, (AP-68). The information contained in the report concerns the control of hydrocarbons and other vapor phase organics which contribute to the formation of oxidants. The document was intended primarily as a general reference for state and local air pollution control personnel. It includes basic information on sources of photochemical oxidant precursors and control of these sources, estimates of control costs, estimates of control technique energy requirements, and estimates of emission reductions achievable through control application.

075 Lead Emissions Report, U.S. Environmental Protection Agency, Industrial Environmental Research Laboratory, Research Triangle Park, NC, June 1976.

Source/Pollutant Key: S 7

This report identifies information sources concerning emission rates and emission inventories of lead compounds which are released into the atmosphere. Listings of lead/lead compound sources and quantities of emissions are included.

076 Methodology for Estimating Emissions From Off-Highway Mobile Sources for the RAPS Program, EPA-450/3-75-002, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, October 1974.

Source/Pollutant Key: M 1, M 99

This report compiled and summarized all available data on emissions, population and usage from seven internal combustion engine categories in the RAPS study area. These categories included outboard motors, snowmobiles, motorcycles, lawn and garden, construction, industrial, and farm engines. This study also compiled a list of data sources for counties and other small areas. Finally, methodologies are derived for estimating emissions down to the county and grid element levels.

077 Methodologies for Countywide Estimation of Coal, Gas and Organic Solvent Consumption, EPA-450/3-75-086, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, December 1975.

Source/Pollutant Key: A 1

This study provides the results of the development of methods for estimating fuel consumption on a countywide basis for area sources in the NEDS data bank. Method were also devised to determine the countywide consumption of organic solvents, gasoline and diesel fuel, retail sales of gasoline, and aircraft landing and take-off cycles. County allocation factors were determined through the use of statistical correlations.

078 Emission Density Zoning Guidebook--A Technical Guide to Maintaining Air Quality Standards Through Land Use Based Emission Limits, EPA-450/3-78-048, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, September 1978.

Source/Pollutant Key: S 99

This report describes the use of Emission Density Zoning (EDZ) to maintain air quality levels. EDZ is defined as "...a type of air pollution control regulation in which the maximum legal rate of emission of an air pollutant is based on location, land area, land use zoning, and air quality constraints." In general, EDZ may be thought of as an air pollution control regulation that is superimposed upon an existing zoning ordinance. This guidebook describes how to implement this emission allocation scheme and includes a step-by-step explanation of the computer software that is needed.

079 Emissions Inventory of Agricultural Tilling, Unpaved Roads, Airstrips, and Heavy Construction Sites, EPA-450/3-74-085, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, November 1974.

Source/Pollutant Key: A 2

Area dust emission sources contribute substantially to the atmospheric particulate burden in many parts of the country. The Environmental Protection Agency has identified several fugitive source categories for inclusion in the National Emissions Data System (NEDS) area source file. Among them are the following categories of fugitive dust sources:

Unpaved roads (dirt and gravel),

Heavy construction sites (such as road and building construction),

Agricultural land tilling, and

Unpaved airstrips.

To determine the impact of these sources, it is necessary to develop a national emission inventory of these sources on a county-by-county basis. Calculation of county emission totals for each source category requires, in addition to the basic emission factor, (1) an appropriate measure of the extent of the source type within the county and (2) correction factors which adjust the emission estimates for local climatic conditions and properties of the emitting surface.

080 Residential and Commercial Area Source Emission Inventory Methodology for the Regional Air Pollution Study, EPA-450/3-75-078, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, September 1975.

Source/Pollutant Key: A 1, A 99

This report presents a methodology for estimating the pollutant emissions from stationary residential and commercial-institutional area sources on an hour-by-hour basis, and apportioning them to a grid system especially designed for RAPS. Data were collected on fuel usage, distribution of residential and commercial-institutional car use, gasoline sales, paint sales, use of dry cleaning fluids, solid waste disposal, and uncontrolled fires for the region. These data were analyzed and a series of models were developed which were used to estimate the area emissions of sulfur dioxide, particulates, nitrogen oxides, hydrocarbons, and carbon monoxide for specified grid squares. A temporal allocation procedure was then developed from the data to apportion emissions on an hourly basis.

081 Study of Area Source Hydrocarbon Emissions, prepared for Illinois Environmental Protection Agency, July 1978.

Source/Pollutant Key: A 6

This study was undertaken to provide an inventory of hydrocarbon emissions suitable for use in evaluating potential control strategies which may be required to ensure the attainment and maintenance of the National Ambient Air Quality Standard (NAAQS) for photochemical oxidants. A total of 32 industrial categories were examined within a six-county region in the Chicago AQMA and a three-county region in the St. Louis AQMA. The survey was focused on emission sources of less than 50 tons/year (area sources) of volatile organic compounds.

The methodology of the study consisted of identifying the population of business establishments which represent potential emission sources in the areas of interest. A statistically designed sampling of this list was surveyed by a questionnaire mailing. Verification of the questionnaire information was obtained by site visits to selected establishments. The resulting data were analyzed by regression analysis techniques to develop models for estimating emissions from the remainder of the population.

082 Seasonal Variations in Organic Emissions for Significant Sources of Volatile Organic Compounds, EPA-450/3-78-023, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, June 1978.

Source/Pollutant Key: S 6, S 99

To investigate the magnitude of discrepancies between emission rates of volatile organic compounds (VOCs) determined on an annual basis and those occurring during the summer season, the significance of sources during the summer season was studied for three areas where oxidant air quality standards have been exceeded. Reactive VOCs were estimated by correcting total VOCs for methane content. Basic data on emissions were provided by output from the National Emissions Data System (NEDS) file. A methodology for adapting annual VOC inventories to reflect summer emission patterns is outlined in the report.

083 Regional Air Pollution Study: Emission Inventory Summarization, EPA-600/4-79-004, U.S. Environmental Protection Agency, Environmental Sciences Research Laboratory, Research Triangle Park, NC, January 1979.

Source/Pollutant Key: S 1

As part of the Regional Air Pollution Study (RAPS), data for an air pollution emission inventory are summarized for point and area sources in the St. Louis Air Quality Control Region. Data for point sources were collected for criteria pollutants and for hydrocarbon species, sulfur trioxide, particle size distribution, and heat. For area sources, data were collected on criteria pollutants, hydrocarbon species, and heat.

All the data have been entered into the RAPS Data Bank. Hourly values are available for all point sources; locations are identified by UTM coordinates (zone 15) to within $\pm$10 m. Area sources are assigned to a network of 1989 grid squares of variable size. The emission inventory is applicable for the years 1975 and 1976 and complements the RAPS aerometric data.

084 Mobile Source Inventories Using Transportation Models, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, 1978.

Source/Pollutant Key: M 1, M 99

Due to the expected increase in use of grid-based photochemical oxidant models to attempt to predict the impact of future HC and NO_x controls on ozone levels, there has been renewed interest in emission inventories with accurate estimates of the spatial and temporal variations in pollutant emissions in urban areas. Because mobile sources contribute such a large proportion of the total HC and NO_x emitted in an urban area, different procedures for translating highway vehicle miles traveled to emissions were investigated and a comparison made of the methodologies used in different cities for compiling gridded mobile source emission inventories. The five cities are: Denver, San Francisco, Los Angeles, Tulsa, and Tampa Bay. The Denver, Los Angeles, and Tulsa inventories were compiled for applications of the SAI photochemical oxidant model. The San Francisco inventory was used in the LIRAC air quality model.

085 Carbon Monoxide Hot Spot Guidelines, Volume I: Techniques, EPA-450/3-78-033, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, March 1978.

Source/Pollutant Key: M 4

This report presents guidelines for the identification and evaluation of localized violations of carbon monoxide air quality standards (i.e., hot spots) in the vicinity of streets and highways. These guidelines facilitate the rapid and efficient review of carbon monoxide conditions associated with existing urban street systems without the need for extensive air quality monitoring. The procedures presented in the guidelines employ traffic and roadway data in two stages of analysis. First, a screening procedure is used to identify specific locations on the highway network that have hot spot potential. This is followed by a verification procedure, which provides a more detailed analysis of specific locations (i.e., those identified by the screening procedure as having hot spot potential). Both the screening and verification procedures utilize a series of nomographs along with the various traffic and street data to assess hot spot potential. The two procedures are performed manually and are based on EPA's Guidelines for Evaluating Indirect Sources.

086 Methodology for the Determination of Emission Line Sources, EPA-450/3-76-035, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, February 1975.

Source/Pollutant Key: M 4, M 5, M 6

This study was performed to develop a methodology which documents the bases and criteria for determining line sources in a metropolitan area, and the sensitivity to monitoring frequency. The study of automotive emissions requires the efficient monitoring of traffic flow, identifying location parameters critical to emissions, and adequate knowledge of vehicular emissions under a range of operating conditions. The report describes the methodology used for documenting the most recent traffic data; estimating emission levels; computing aggregate emissions and concentrations of CO, NO_x, and HC; conducting sensitivity analyses; and verifying the methodology in the St. Louis AQCR.

087 Revision of Emission Factors for Petroleum Refining, EPA-450/3-77-030, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, October 1977.

Source/Pollutant Key: S 1, P 6

This report updates existing AP-42 data on petroleum refining. The general descriptions of petroleum refining objectives and the major processes used to achieve these objectives are expanded. Detailed process descriptions are prepared for 14 major refinery emission sources. These descriptions are accompanied by a discussion of emission characteristics and applicable emission control technology. In addition, corrections, adjustments, and additions are made to a major portion of the nonfugitive emission factors.

088 Emission Factors and Frequency of Leak Occurrence for Fittings in Refinery Process Units, EPA-600/2-79-044, U.S. Environmental Protection Agency, Industrial Environmental Research Laboratory, Research Triangle Park, NC, February 1979.

Source/Pollutant Key: P 6, A 6

As part of EPA's petroleum refinery assessment program, this report discusses fugitive hydrocarbon emissions which were measured from a number of types of sources in refineries. Data was obtained from nine refineries throughout the United States. Sources measured for hydrocarbon emissions included valves, flanges, pump seals, compressor seals, relief valves, and process drains. Emission factors for nonmethane hydrocarbon emissions from these sources were developed. In addition, a source "screening" procedure was developed and nomographs were prepared which relate the maximum screening value to the percentage of sources leaking and to the percentage of total emissions represented by these leaking sources.

089 A Lead Emission Factor for Reentrained Dust From a Paved Roadway, EPA-450/3-78-021, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, April 1978.

Source/Pollutant Key: A 7, M 7

This report documents the methodology used to develop the lead emission factor for reentrained dust. Samples of airborne particulate from two paved roadways were analyzed for lead content. The results of these analyses were used to derive the combined particulate lead emission factor for vehicle exhaust and reentrained dust. A separate calculation procedure was used to divide the combined particulate emission factor into the emission factors for vehicle exhaust and for reentrained dust.

090 Development of Questionnaires for Various Emission Inventory Uses, EPA-450/2-78-122, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, June 1979.

Source/Pollutant Key: S 99

This report was written as a guide for agencies interested in developing emission inventory mail-out questionnaires. It addresses both the physical and psychological constraints on questionnaire design. The information provided is based on the knowledge of agencies and individuals that have experience in the design of questionnaires.

The first section discusses the choice of mail-out questionnaires over other information-gathering methods. The second section describes the individual elements of a mail-out questionnaire--the cover letter, the instructions, and the questions--and what should be included in each. The third section addresses design considerations for maximizing the return rate and the accuracy. Formulation of appropriate questions is also discussed. The formatting of a questionnaire for computer input and the use of a computer's capabilities are described. Appendices include sample questionnaire elements.

091 Volatile Organic Compound (VOC) Species Data Manual, EPA-450/4-80-015, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, July 1980.

Source/Pollutant Key: S 6

This manual summarizes the available species information on Volatile Organic Compounds (VOC) from stationary and mobile sources. The data are provided in a format that is especially useful to those preparing emission inventories for photochemical models. A data table format has been developed that depicts the species data for each source in a manner to facilitate the allocation of all VOCs into reactivity classes as required by various photochemical models. This table also includes the following information for each VOC identified: SAROAD code, chemical name and classification, molecular weight, and percent concentration by weight and volume.

092 Line and Area Source Emissions From Motor Vehicles in RAPS Program, EPA-450/3-77-019, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, June 1976.

Source/Pollutant Key: A 1, A 99, M 1, M 99

This report presents a methodology for estimating line source and nonline or area source emissions for a particular study region. The methodology developed allows the estimation of emissions from line sources for any specified hour of the day or any specified day of the week. In addition, a methodology is presented which enables CO, HC, NO_x, particulate, and SO_2 emissions to be estimated from nonline sources. These estimates can also be performed for any hour of the day and day of the week and account for cold start phenomena. The methods and techniques devised are tested for a number of time-of-the-day/day-of-week combinations.

093 A Method for Characterization and Quantification of Fugitive Lead Emissions From Secondary Lead Smelters, Ferroalloy Plants and Gray Iron Foundries (Revised), EPA-450/3-78-003, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, August 1978.

Source/Pollutant Key: P 7

This report summarizes current information relative to fugitive lead emissions from secondary lead smelters, ferroalloy plants, and gray iron foundries. It also investigated the application of fugitive lead emission factors developed for other source categories, and reported the applicability of fugitive lead factors developed from a field study. In addition, current state-of-the-art techniques which were developed for source measurements of fugitive emissions (i.e., inplant) and ambient measurements of fugitive emissions (i.e., upwind (downwind)) are discussed.

094 Emission Factor Development for Leaf Burning, EPA-450/3-76-044, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, December 1976.

Source/Pollutant Key: A 1, A 4, A 6

This report discusses the methodology and results of a test program conducted to develop emission factors for particulates, carbon monoxide, and hydrocarbons from the burning of street tree leaves. Leaf samples from 15 species were burned under controlled conditions to obtain the emission factors for each tree species. In addition, the moisture content of the leaves was maintained at two distinct levels, 10 and 20 percent (dry weight basis), to ascertain the affect of this variable on emission rates. Raising the leaf moisture level generally increased the production of all three pollutants, although in varying amounts.

095 Evaluation of Particulate Emission Factors for Vehicle Tire Wear, EPA-450/4-79-011, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, June 1979.

Source/Pollutant Key: M 2

Vehicle-related emissions are a major contributor to urban particulate concentrations. Particles from tire wear have been identified by microscopic analysis as a significant component of roadside dust. This study discusses the mechanics for vehicle tire wear, the available methods for evaluating tire tread wear, and calculations of tire wear estimates. Existing emission rate estimates are analyzed and a breakdown of the various components of tire wear loss are given.

096 Development of Emissions Factors for Fugitive Dust Sources, EPA-450/3-74-037, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, June 1974.

Source/Pollutant Key: A 2

This report presents the results of an extensive field testing program which was conducted to determine emission factors for four categories of fugitive dust sources:

Unpaved roads and airstrips,

Agricultural tilling,

Construction sites, and

Aggregate storage piles.

The testing was necessitated by the lack of reliable data on the characteristics of these sources. For each source type, the observed relationship between emission rate and source activity was used to derive a basic emission factor. In addition, test data were analyzed to determine the dependence of the emission rate on properties of the emitting surfaces and characteristics of the vehicle or implement which caused the emissions.

097 Fine Particulate Emission Inventory and Control Survey, EPA-450/3-74-040, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, January 1974.

Source/Pollutant Key: P 2, A 2

This report presents an emission inventory of fine particulates in the United States. Attention was focused on estimates of primary particulates, and not on secondary particulates formed by subsequent reaction of source emissions in the atmosphere. Both point and area stationary sources of fine particulate were studied and their emissions included in the emission inventory. A compilation of information on the chemical and physical properties of fine particulate emissions is given, as is a methodology for performing a detailed fine particulate emission inventory.

098 Emission Factors and Inventories, Proceedings of the Specialty Conference sponsored by the West Coast Section and the Technical Council of the Air Pollution Control Association, Anaheim, California, November 13-16, 1978.

Source/Pollutant Key: S 1

This reference includes 17 papers on diverse aspects of emission inventories and emission factors. Topics covered include pesticide emissions, fine particulate emissions, mobile source emission estimates, emission inventory requirements for photochemical air quality simulation models, and a discussion of the Emission Inventory Subsystem (EIS).